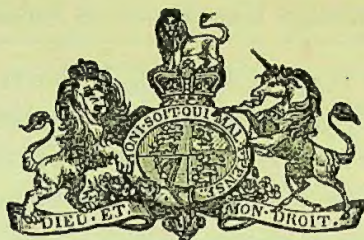


426/17

11

1858

RECORDED



---

A.D. 1858, 14th DECEMBER. N° 2865.

---

### Manufacture of Vinegar from Refuse Product of Starch.

*(This Invention received Provisional Protection only.)*

**PROVISIONAL SPECIFICATION** left by Jacques Théodore Smets at the Office of the Commissioners of Patents, with his Petition, on the 14th December 1858.

I, JACQUES THÉODORE SMETS, of Plaçamen, in the Empire of France, 5 Distiller, do hereby declare the nature of the said Invention for "A METHOD OF MAKING VINEGAR FROM A REFUSE PRODUCT OBTAINED IN THE MANUFACTURE OF STARCH," to be as follows:—

In the residuum which remains in the manufacture of starch, and which is generally used for feeding cattle, there remains from about twenty to twenty- 10 five per cent. of starch of excellent quality, but of too fine a grain to deposit itself spontaneously, and become detached from the thick particles with which it is mixed; it is this substance, still very rich, but of small value, which I take fresh after it has settled four or five days, and in the first instance submit to saccharification, either by using malt or simply sulphuric acid in a wooden 15 vat, heated by steam or otherwise. In the first case, that of saccharification by malt, I employ about twenty lbs. of malt to about one hundred quarts of residuum; these materials, whether in greater or smaller quantities, but always following the same proportions, are mixed in a vat where steam is introduced to keep the mass constantly moving until it has reached a 20 temperature of from 150° to 160° Fahrenheit, after which the steam is shut off, and the vat covered and left for about two hours; the mass then being in a fluid state, steam is again introduced, and the mass is made to boil three or



---

*Smets' Method of Making Vinegar from a Refuse Product of Starch.*

---

four hours; the steam is again shut off, & the vat covered and left in a quiescent state for from eighteen to twenty hours, after which the clear part is drawn off into another vat, and that part which is thick or half fluid, is put into another vat, and to each is added a sufficient quantity of pure water to raise the mash in the vats to about 6° Beaumé, they are then made to ferment 5 by adding the necessary quantity of yeast, about a pint of yeast to one hundred quarts if the yeast be liquid, or half a pound if the yeast is dry. The vat containing the clear liquor produces excellent yeast, which is taken off, and the alcoholic fermentation terminated. The clear liquor or wine is then in a state to make vinegar, and the thick liquor in the other vat is put into a vat of a particular con- 10 struction, hermetically closed by a head fastened upon it, which communicates with a refrigerating worm; it is brought into a state of ebullition by a steam pipe, and kept so long enough to evaporate; the spirituous parts which are collected in a liquid state, and filtered through pounded charcoal placed upon a false bottom in a vat of a particular construction, and afterwards added to 15 the clear liquor or wine to give it a certain alcoholic quality of from nine to ten per cent., which is necessary to obtain first quality vinegar. If saccharification is produced by sulphuric acid as a matter of economy, to use the residuum only, without the addition of other grain or flour, I proceed to place it in a vat, and use steam, as before stated, but according to the quantity of 20 residuum operated on, I proceed by degrees, and by successive quantities, commencing by placing about one inch deep of residuum at the bottom of the vat, then at once I add the necessary quantity of sulphuric acid of sixty degrees required for the operation at the rate of two pounds to about one hundred quarts of residuum, then the steam is let into the vat. When 25 this first portion is in a state of ebullition and perfectly fluid, I continue adding small quantities of the residuum in succession every ten minutes, so as to keep up a succession of small quantities for a space of from four to five hours; the ordinary quantity put into a vat, and under decomposition, should not exceed three-fourths of the capacity of the vat. The quantity being completed in the 30 time stated, I cover the vat, and maintain it in a state of ebullition by a moderated jet of steam for about four hours, then turn off the steam and proceed to saturation for the complete elimination or expulsion of the sulphuric acid, according to the quantity employed, add about 6 lbs. of chalk or carbonate of lime to 4 lbs. of acid; the chalk should be pounded and made to form with 35 water a sort of semi-liquid milk, which must be stirred and poured by small quantities into the vat; at the commencement particularly, and at each addition the whole mass must be stirred, and more chalk must not be added till the froth has subsided, and the carbonic acid is disengaged, then cover the



---

*Smets' Method of Making Vinegar from a Refuse Product of Starch.*

---

vat, and let it stand, as explained in the first operation, and treat it in all respects in the same manner to obtain the first liquor or wine. The entire quality and quantity of the subsequent productions depend, firstly, on a perfect saccharification to produce the liquor or wine, and afterwards on its efficient  
5 treatment, and its containing a sufficient quantity of alcohol to make pure first quality vinegar.

Now to proceed, I make, firstly, my mixture of clear liquor or wine, and of filtered mucus in one or more vats specially adapted to this first amalgamation, which I leave to react upon its mass from fifteen days to one month. Then,  
10 after this rest, and a certain degree of clarification, I draw off this liquid into other vessels of the same size, but three-fourths filled with shavings of beech wood ; the liquor or wine, remaining in that state from fifteen days to a month, matures and clarifies itself completely, and is then ready to be placed in the vinegar vases.

15 My vessels or vinegar vases are a large pipe, or a tun, or a long tub, with a head at both ends placed horizontally. Before putting them in place there is introduced an open cylinder of beech wood, strongly constructed and fastened, an oaken axle, with its ends rounded passes through it, the ends extending beyond the heads of the tub ; this beech cylinder forming a sort of cage is  
20 stuffed with beech shavings. This cage is supported upon the wooden axes, which are inserted through the ends of the tub rather above the centre. These vessels so arranged are ready to work, a tap of wood or other non-oxidizable substance is placed below the opening through which the axes are inserted, and the vessel is filled with the strongest and best quality vinegar,  
25 until it runs out through the orifice of the tap ; then shut off the tap and fill up with liquor or wine previously matured and clarified to within an inch or so of the opening through which the axes of the cylinder work. The place containing the vessels is to be heated to a temperature of from 75° to 85° Fahrenheit, then for several days I give a half turn every 12 hours to the  
30 beech wood cylinder, of which more than one half perfectly moist remains out of the liquor. The first liquor or wine added to the vinegar having arrived at a sufficient degree of acetification, and the liquid in the vessel being quite clear and acetified, I proceed to the first drawing off by turning the tap into a conduit, which empties the vessel up to the level of the tap, after which I draw off the same quantity, and replenish every eight days.

---

LONDON :

Printed by GEORGE EDWARD EYRE and WILLIAM SPOTTISWOODE,  
Printers to the Queen's most Excellent Majesty. 1859.